# Exhibit 11



August 10, 2008

### A Tall, Cool Drink of ... Sewage?

By ELIZABETH ROYTE

Before I left New York for <u>California</u>, where I planned to visit a water-recycling plant, I mopped my kitchen floor. Afterward, I emptied the bucket of dirty water into the toilet and watched as the foamy mess swirled away. This was one of life's more mundane moments, to be sure. But with water infrastructure on my mind, I took an extra moment to contemplate my water's journey through city pipes to the wastewater-treatment plant, which separates solids and dumps the disinfected liquids into the ocean.

A day after mopping, I gazed balefully at my hotel toilet in Santa Ana, Calif., and contemplated an entirely new cycle. When you flush in Santa Ana, the waste makes its way to the sewage-treatment plant nearby in Fountain Valley, then sluices not to the ocean but to a plant that superfilters the liquid until it is cleaner than rainwater. The "new" water is then pumped 13 miles north and discharged into a small lake, where it percolates into the earth. Local utilities pump water from this aquifer and deliver it to the sinks and showers of 2.3 million customers. It is now drinking water. If you like the idea, you call it indirect potable reuse. If the idea revolts you, you call it toilet to tap.

Opened in January, the Orange County Groundwater Replenishment System is the largest of its type in the world. It cost \$480 million to build, will cost \$29 million a year to run and took more than a decade to get off the ground. The stumbling block was psychological, not architectural. An aversion to feces is nearly universal, and as critics of the process are keen to point out, getting sewage out of drinking water was one of the most important public health advances of the last 150 years.

Still, Orange County forged ahead. It didn't appear to have a choice. Saltwater from the Pacific Ocean was entering the county's water supply, drawn in by overpumping from the groundwater basin, says Ron Wildermuth, who at the time we talked was the water district's spokesman. Moreover, population growth meant more wastewater, which meant building a second sewage pipe, five miles into the Pacific — a \$200 million proposition. Recycling the effluent solved the disposal problem and the saltwater problem in one fell swoop. A portion of the plant's filtered output is now injected into the ground near the coast, to act as a pressurized barrier against saltwater from the ocean. Factor in Southern California's near chronic drought, the county's projected growth (another 300,000 to 500,000 thirsty people by 2020) and the rising cost of importing water from the Colorado River and from Northern California (the county pays \$530 per acre-foot of imported water, versus \$520 per acre-foot of reclaimed water), and rebranding sewage as a valuable resource became a no-brainer.

With the demand for water growing, some aquifers dropping faster than they're replenished, snowpacks thinning and <u>climate change</u> predicted to make dry places even drier, water managers around the country, and the world, are contemplating similar schemes. Los Angeles and San Diego, which both rejected potable reuse, have raised the idea once again, as have, for the first time, DeKalb County, Ga., and Miami-Dade County, Fla.

While Orange County planned and secured permits, public-relations experts went into overdrive, distributing slick educational brochures and videos and giving pizza parties. "If there was a group, we talked to them," says Wildermuth, who recently left Orange County to help sell Los Angelenos on drinking purified waste. "Historical societies, chambers of commerce, flower committees." The central message was health and safety, but the persuaders didn't skimp on buzz phrases like "local control" and "independence from imported water." Last winter, the valve between the sewage plant and the drinking-water plant whooshed open, and a new era in California's water history began.

When I visited the plant, a sprawl of modern buildings behind a concrete wall, in March, Wildermuth, in a blue sport coat and bright tie, acted as my guide. "Quick!" he shouted at one point, mounting a ledge and clinging to the rail over a microfiltration bay. "Over here!" I clambered up just as its contents finished draining from the scum-crusted tank. The sudsy water, direct from the sewage-treatment plant, was the color of Guinness. "This is the most exciting thing you'll see here, and I didn't want you to miss it," he said.

Wildermuth went on to explain what we were looking at: inside each of 16 concrete bays hangs a rack of vertical tubes stuffed with 15,000 polypropylene fibers the thickness of dental floss. The fibers are stippled with holes 1/300th the size of a human hair. Pumps pull water into the fibers, leaving behind anything larger than 0.2 microns, stuff like bacteria, protozoa and the dread "suspended solids."

The excitement and the bubbles were backwash: every 21 minutes, air is injected into the microfibers to blast them clean. The schmutz goes back to the sewage-treatment plant, and the cleaner water, now the color of chamomile tea, is pumped toward reverse-osmosis filters in another building. Before we saw that process, Wildermuth led me underground to inspect several enormous pumps and pipes large enough to crawl through. I noted that everything was clearly labeled and scrupulously clean. Then it dawned on me: reassurance was the reason we'd taken the detour.

We followed the pipes up to a sunlit, metal-clad building where the water, now dosed with an antiscalant and sulfuric acid to lower its pH, was forced at high pressure through hundreds of white tubes filled with tightly spiraled sheets of plastic membranes. Reverse osmosis, Wildermuth says, stops cold almost all nonwater molecules (things like salts, viruses and <u>pharmaceuticals</u>). The stuff that's removed is washed back to a pipe that discharges into the ocean. The filtered water, now known as permeate, moves one building over, where it's spiked with hydrogen peroxide, a disinfectant, and then circulated past 144 lamps emitting ultraviolet light. "Destruction of compounds through photolysis," Wildermuth said, nodding. Anything that's alive in this water can no longer reproduce.

Strolling back through the campus, Wildermuth took me to a three-part demonstration sink with faucets streaming. The basin on the right contained reverse-osmosis backwash: it was molasses black, topped with a rainbow slick of oil. "Don't touch," Wildermuth warned as I leaned in for a better look at the ocean-bound rejectamenta. The middle basin contained the chamomile water from microfiltration. And on the left was the stuff Orange County would eventually drink. It was clear and had no smell.

But even this suctioned, sieved and irradiated water wasn't quite set for sipping; it still needed to be decarbonized and dosed with lime, to raise its pH. Finally it would enter a massive purple pipe, which dives into the ground inside a nearby pump house and reappears 13 miles to the north, in Anaheim. There, the water would pour into Kraemer Basin, a man-made reservoir, where it would mix with the lake water and

filter for six months through layers of sand and gravel hundreds of feet deep before utilities throughout the county pumped it into taps.

The reservoir is a prosaic ending for a substance that's been through the glitziest of technological wringers, transformed from sewage to drinking water only to be humbly redeposited into the earth. This final filtering step isn't necessary, strictly speaking, but our psyches seem to demand it.

To understand the basics of contemporary water infrastructure is to acknowledge that most American tap water has had some contact with treated sewage. Our wastewater-treatment plants discharge into streams that feed rivers from which other cities suck water for drinking. By the time New Orleans residents drink the Mississippi, the water has been in and out of more than a dozen cities; more than 200 communities, including Las Vegas, discharge treated wastewater into the Colorado River. That's the good news. After heavy rains, many cities discharge untreated sewage directly into waterways — more than 860 billion gallons of it a year, according to the Environmental Protection Agency. However — and this is where we can take solace — the sewage is massively diluted, time and sunlight help to break down its components and drinking-water plants filter and disinfect the water before it reaches our taps. The E.P.A. requires utilities to monitor pathogens, and there hasn't been a major waterborne-disease outbreak in this country since 1993. (Though there have been 85 smaller outbreaks between 2001 and 2006.)

So confident are engineers of so-called advanced treatment technologies that several communities have been discharging highly treated wastewater directly into reservoirs for years. Singapore mixes 1 percent treated wastewater with 99 percent fresh water in its reservoirs. (In Orange County, the final product will contain 17 percent recycled water.) Residents of Windhoek, Namibia, one of the driest places on earth, drink 100 percent treated wastewater. For 30 years, the Upper Occoquan Sewage Authority, in Virginia, has been mixing recycled wastewater with fresh water in a reservoir and serving it to more than a million people. Still, no system produces as much recycled water as Orange County (currently 70 million gallons a day, going up to 85 million by 2011), and none inserts as many physical and chemical barriers between toilet and tap.

Environmentalists, river advocates and California surfers — the sort of people who harbor few illusions about the purity of our rivers and oceans — generally favor water recycling. It beats importing water on both economic and environmental grounds (about a fifth of California's energy is used to move water from north to south). "The days are over when we can consider wastewater a liability," says Peter Gleick, president of the Pacific Institute, an environmental research group in Oakland. "It's an asset. And that means figuring out how best to use it."

As we deplete the earth's nonrenewable resources, like oil and metals, the one-way trip from raw material to disposed and forgotten waste makes less and less sense. Already we recycle aluminum to avoid mining, compost organic material to avoid generating methane in landfills and turn plastic into lumber. As it becomes more valuable, water will be no different.

"We have to treat all waste as a resource," Conner Everts, executive director of the Southern California Watershed Alliance, says. "Our water source, hundreds of miles away, is drying up. If the population is growing, what are our options?"

Water conservation could take us a long way, as would lower water subsidies for farmers. But sooner or

later, stressed-out utility managers come back to the same idea: returning wastewater to the tap.

The process isn't risk-free. Some scientists are concerned that dangerous compounds or undetectable viruses will escape the multiple physical and chemical filters at the plant. And others suggest that the potential for human error or mechanical failure — clogged filters or torn membranes that let pathogens through, for example — is too great to risk something as basic to public health as drinking water.

Recycled water should be used only as nondrinking water, says Philip Singer, the Daniel Okun Distinguished Professor of Environmental Engineering at the <u>University of North Carolina</u>. "It may contain trace amounts of contaminants. Reverse osmosis and UV disinfection are very good, but there are still uncertainties."

And then there are those whose first, and final, reaction is "yuck."

"Why the hell do we have to drink our own sewage?" asks Muriel Watson, a retired schoolteacher who sat on a California water-reuse task force and founded the Revolting Grandmas to fight potable reuse. She toured the Orange County plant but came away unsatisfied. "It's not the sun and the sky and a roaring river crashing into rocks" — nature's way of purifying water. "It's just equipment."

The Santa Ana River forms in the San Bernardino Mountains and flows southwest through Riverside and then Orange counties to the sea, the largest coastal stream in Southern California. But that's not saying much: in the summer, the Santa Ana's flow is nearly 100 percent wastewater. The river's base flow — what enters the channel from runoff, rain and wastewater-treatment plants — is increasing. Not only is more effluent entering the river, a consequence of population growth, but as the county develops and paves more surfaces, rainwater runs off the earth faster, sluicing into the river channel before it can sink into the earth and replenish aquifers.

To capture and clean that water, the Orange County Water District has gone into hyper-beaver mode on the river. Twenty miles upstream from Anaheim, the water district has created the Prado Wetlands. It's a lovely place, lush with willow and mule fat, busy with butterflies and, over the course of the year, 250 species of birds. Moving through a series of rectangular ponds, river water filters slowly through thickets of cattails and bulrushes meant to extract excess nitrate from upstream dairy farms and sewage-treatment plants. Returned to the main channel, the water wends around T- and L-shaped berms that slow the water and maximize its contact with the river bottom. Gates and sluiceways then shunt the water into nine man-made ponds and pits. The goal is to get more water into the county's groundwater basin, a 350-square-mile, 1,500-foot-deep bathtub of sand and gravel layers, which act as natural scrubbers. The system upriver — using gravity and gravel — and the system in Fountain Valley — in tanks and tubes — both achieve the same goal. Sort of.

It's one of the many pardoxes of indirect potable reuse that the water leaving the plant in Fountain Valley is far cleaner than the water that it mingles with. Yes, the water entering the sewage-treatment plant in Fountain Valley is 100 percent wastewater and has a T.D.S. — a measure of water purity, T.D.S. stands for total dissolved solids and refers to the amount of trace elements in the water — of 1,000 parts per million. But after microfiltration and reverse osmosis, the T.D.S. is down to 30. (Poland Spring water has a T.D.S. of between 35 and 46.) By contrast, the "raw" water in the Anaheim basins has a T.D.S. of 600.

If everything in the Fountain Valley plant is in perfect working order, its finished water will contain no detectable levels of bacteria, pharmaceuticals or agricultural and industrial chemicals. The same can be said of very few water sources in this country. But once the Fountain Valley water mingles with the county's other sources, its purity goes downhill. Filtering it through sand and gravel removes some contaminants, but it also adds bacteria (not necessarily harmful, and local utilities will eventually knock them out them with chlorine) and possibly pharmaceuticals.

In other words, nature messes up the expensively reclaimed water. So why stick it back into the ground? "We do it for psychological reasons," says Adam Hutchinson, director of recharge operations for the water district. "In the future, people will laugh at us for putting it back in, instead of just drinking it."

Psychologists and marketers have spent a lot of time trying to figure out what makes a product, or a process, seem natural. Obviously, framing the issue properly is the key to acceptance. "If people connect the history of their water to contamination, you'll get a disgust response no matter how you treat that water in between," says Brent Haddad, an associate professor of environmental studies at the University of California at Santa Cruz. "But if you enable people to frame out that history by telling them, for example, that 'the clean water has been separated from the polluted water,' they no longer make that connection." We abridge history all the time, Haddad adds. "Think of the restaurant fork that was in the mouth of someone with a contagious disease, the pillow that was underneath people doing private adult things in a hotel bedroom. If you think of it that way, the intermediate steps, like washing with hot water, don't matter."

All water on earth is recycled: the same drops that misted Devonian ferns and dripped from the fur of woolly mammoths are watering us today. From evaporation to condensation and precipitation, the cycle goes on and on. But in the planet's drier regions, where the population continues to rise, we can expect the time between use and reuse to grow ever shorter, with purification, pipes and pumps standing in for natural processes. Instead of sand and gravel filtering our drinking water, microfibers and membranes will do the job; instead of sunlight knocking out parasites, we'll plug in the UV lamps.

You could argue that in coming to terms with wastewater as a resource, we'll take better care of our water. At long last, the "everything is connected" message, the bedrock of the environmental movement, will hit home. In this view, once a community is forced to process and drink its toilet water, those who must drink it will rise up and change their ways. Floor moppers will switch to biodegradable cleaning products. Industry will use nontoxic material. Factory farms will cut their use of <u>antibiotics</u>. Maybe we'll even stop building homes in the desert.

But these situations are not very likely. No one wants to think too hard about where our water comes from. It's more likely that the virtuosity of water technology will let polluters off the hook: why bother to reduce noxious discharges if the treatment plant can remove just about anything? The technology, far from making us aware of the consequences of our behavior, may give us license to continue doing what we've always done.

The recycled water coming out of the sink at the Fountain Valley plant looked good enough to drink. Wildermuth didn't press me to taste it, but I was eager for a sample — to satisfy my curiosity, and to be polite. I filled a plastic cup and took a sip. The water tasted fine, if a little dry; I'm used to something with more minerals. It did cross my mind that any potential health issues from drinking so-far undetectable

levels of contaminants would be cumulative and take decades to manifest.

Then I reminded myself: no naturally occurring water on earth is absolutely pure. And most everything that's in Orange County's reclaimed water is in most cities' drinking water anyway.

It was hot, my throat was parched, and I asked for a refill.

Elizabeth Royte is the author of "Bottlemania: How Water Went on Sale and Why We Bought It."

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# Exhibit 12

# CITY OF SAN DIEGO ADVANCED WATER TREATMENT RESEARCH STUDIES

### FINAL REPORT

August 2007

Prepared For:

City of San Diego

Prepared By:

**MWH** 

#### 5. SUMMARY AND CONCLUSIONS

The objectives of this study were met by operating pilot trains on tertiary water from the NCWRP over an 18-month period (July 2004 – December 2005). Train 1 consisting of UF followed by RO was used to assess the integrity of new generation RO products currently offered for water reuse. Train 2 consisting of UF/RO/UV peroxide was used to evaluate AWT performance and assess the ability of UV peroxide to remove select EDC/PPCP when applied at a dose required for 1 log NDMA removal. Major conclusions can be made from the results:

#### **RO** Integrity Monitoring

- A variety of integrity monitoring methods are available to ensure consistent RO system performance of a full scale AWT system;
- The four new generation RO membranes tested achieved between 99% to 99.99% (2-4 log) removal of MS2 phage;
- The TRASAR system offered by Nalco Inc. shows potential to provide on-line measurement of RO integrity with sensitivity greater than 6 log.

#### **AWT Performance**

- AWT reduced all compounds regulated by state and federal drinking water standards to below their MCLs contaminants of concern below their notification levels and all 29 selected EDC/PPCP below their MDLs:
- The AWT equipment contaminant removal rates observed in this study were consistent with previous equipment performance studies;
- Compared to samples from San Diego reservoirs which store untreated imported water,
   AWT product water was lower or equivalent in concentration for nearly all contaminants
   /parameters measured;
- RO system operated with no fouling for greater than 1200 hours with recovery of 75% and flux of 12 gfd.

# Exhibit 13

## 🛂 The Jakarta Post

Published on The Jakarta Post (http://www.thejakartapost.com)

### Singapore NEWater starts gaining support

Tifa Asrianti, The Jakarta Post, Singapore | Wed, 07/09/2008 10:48 AM | City

"Have you ever drunk NEWater?" *The Jakarta Post* asked Ng Ngee Hua, a taxi driver, last week while traveling from Suntec City to Orchard Road, Singapore.

He smiled at the question.

"Yes, I've drunk NEWater. It's fresh and clean, just like any other kind of drinking water. I'm sure the government has made sure NEWater is good enough for public consumption," said Ng, 18.

His colleague, Lim Boon Huat, said he had no problems drinking NEWater. ·



The Singapore government has recycled

wastewater into clean water, called NEWater, for the past few years. (JP/Tifa Asrianti)

"NEWater is no different to other water. Water today is the same as the water that existed in the dinosaur era." he said.

NEWater is potable water that the Singaporean government produces from treated wastewater. NEWater is just one of four kinds of tap water in the country. The rest of the water comes from Malysia, reservoir runoff or desalination plants.

Yap Kheng Guan, director of the 3P network at Singapore's Public Utilities Board (PUB), said the government distributed free samples of NEWater during special events to promote the product.

"Singaporeans drank NEWater together for the first time two years ago on our national day. Since

then, the public has gradually accepted NEWater," he said.

He said people were hesitant to drink the treated wastewater. However, he added, the government invited the public to learn about the process.



**DEVIL IN DETAILS:** A tour guide

explains how wastewater is processed to become clean water at the NeWater Visitors Center in Bedok, Singapore. (*JP/Tifa Asrianti*)

The NEWater Visitors Center was built at the Bedok plant by the PUB. Inside the Visitors Center, the public learn how wastewater is treated into potable water.

To ensure the quality of water at the NEWater plant, the process comprises four stages: ultrafiltration, reverse osmosis, UV disinfection and water conditioning.

During the ultra-filtration stage, the water passes through hollow membranes to filter out suspended solids, bacteria, pathogens and viruses.

With the average membrane pore size only 0.02 microns, the filtered water contains only dissolved salts and organic molecules and will be ready for reverse osmosis.

In reverse osmosis, the water is passed under high pressure through a semi-permeable membrane. This process removes elements still present in the UF process.

After reverse osmosis, the water is treated further with UV light as an added safety measure. The last stage is water conditioning to adjust the acid-alkali or pH balance, which makes NEWater ready to be piped off.

"The plant runs for 24 hours, seven days a week, so our officers check the water quality every eight hours," Yap said.

NEWater currently supplies only 1 percent of Singapore's total water consumption. The amount will be increased progressively to about 2.5 percent of total consumption by 2011.

The rest of the NEWater is used for industrial purposes, such as factories, electronic industries,

commercial buildings and other industries for non-potable uses.

In addition to the Bedok plant, which produces up to 18 million gallons per day, Singapore has three other NEWater plants in Kranji with a capacity of up to 17 million gallons per day, Ulu Pandan with 3.2 million gallons and Seletar with 5 million gallon.

Yap said his board would soon build a fifth plant in Changi to produce 500 million gallons per day, as it aimed to have NEWater supply 30 percent of Singapore's total water by 2011.

To provide more water to residents, the Singaporean government also plans to increase water reservoir coverage from 50 percent of Singapore's land to two-thirds by 2009.

Singapore has been importing water for decades from Malaysia. The two water agreements signed by Singapore and Malaysia, however, are set to expire by 2011 and 2061 respectively, and the countries' bilateral relations are deteriorating due to a dispute over the price of untreated water.

Singapore consumes 300 million gallons of water per day, equivalent to 1.4 trillion cubic meters, inclusive of industrial water. With the city-state's limited sources of freshwater, Singapore is able to supply its 4.6 million residents from those sources.

Yaacob Ibrahim, Singapore's environment and water minister, said that besides supplying water, the government was also educating the public to save energy and water.

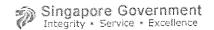
"We challenge people to save 9 liters of water per day by cutting shower times by one minute," he said.

Ng, whose family of five spends around \$50 per month on water, supports the program.

"We can afford the bill but the problem is we consume a lot of water. We should conserve water," Ng said.

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# Exhibit 14



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#### Overview

The Singapore Water Reclamation Study (NEWater Study) was initiated in 1998 as a joint initiative between the Public Utilities Board (PUB) and the Ministry of the Environment and Water Resources (MEWR). The primary objective of the joint initiative was to determine the suitability of using NEWater as a source of raw water to supplement Singapore's water supply. NEWater is treated used water that has undergone stringent purification and treatment process using advanced dual-membrane (microfiltration and reverse osmosis) and ultraviolet technologies. NEWater could be mixed and blended with reservoir water and then undergo conventional water treatment to produce drinking water (a procedure known as Planned Indirect Potable Use or Planned IPU).

Planned IPU as a source of water supply is not new. It has been practised in several parts of the United States for more than 20 years. At Water Factory 21, Orange County Water District, Southern California, high quality water reclaimed from treated used water has been injected into ground water since 1976. Similarly, at Upper Occoquan Sewage Authority (UOSA), North Virginia, high quality reclaimed water is discharged into Occuquan Reservoir since 1978. Occoquan Reservoir is a source of water for more than a million people living in the vicinity of Washington DC.



**NEWater**Bottled Reverse Osmosis Water

Water reclamation is a growing trend in the U.S. and around the world. In the U.S., there are several other water reclamation projects that are now being planned or under construction. Two of them are at Gwinnett near Atlanta, Georgia and at Scottsdale near Phoenix, Arizona.

In 2001, PUB embarked on a new initiatives to increase water supply from unconventional sources for non-potable use. The use of NEWater for wafer fabrication processes, non-potable applications in manufacturing processes as well as air-con cooling towers in commercial buildings would free large amount of potable water for other potable purposes.

The NEWater Factories at Bedok and Kranji Water Reclamation Plants was commissioned at the end of 2002. Following that since Feb 2003, NEWater has been supplied to wafer fabrication plants at Woodlands and Tampines/Pasir Ris and other industries for non-potable use. In Jan 2004, another

NEWater

milestone in the NEWater initiative was accomplished with the commissioning of the third NEWater Factory at Seletar Water Reclamation Plant which began supplying NEWater to the wafer fabrication plants at Ang Mo Kio. The total capacity of the 3 NEWater factories is 92,000 m3/day or 20 mgd.

PUB has also completed its evaluation of the Expert Panel's report and accepted the proposal to use NEWater for indirect potable use in Sep 2002. This means mixing and blending NEWater with raw water in the reservoirs before undergoing conventional treatment at the waterworks for supply to the public for potable use. PUB has introduced 3 mgd of NEWater (about 1% of total daily water consumption) into our raw water reservoirs. The amount will be increased progressively to about 2.5% of total daily water consumption by 2011.

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### DailyBreeze.com

### Mayor rethinks recycled water

L.A.: Villaraigosa revisits idea he opposed in 2001 with plan to reclaim 140,000 acre-feet of water per year.

By Kerry Cananaugh, Staff Writer

Article Launched: 05/14/2008 11:07:48 PM PDT
Seven years after the death of a controversial plan to recycle sewage water into drinking water, Mayor Antonio Villaraigosa has resurrected the idea as one way Los Angeles could provide much-needed water to its growing population.

The reclamation concept - at one time opposed by Villaraigosa - is among a dozen ideas that will be proposed by the mayor and the Department of Water and Power in a new watersupply action plan set to be announced today.

The proposal outlines how Los Angeles will conserve and recycle enough water over the next 20 years to serve an expected 500,000 more Angelenos without having to import more water.

The effort to drought-proof the city and its more than 4million residents comes as regional leaders try to find ways to deal with dwindling supplies from Northern California, the Sierra and the Colorado River.

"L.A.'s future depends on our willingness to adopt an ethic of sustainability. If we don't

commit ourselves to conserving and recycling water, we will tap ourselves out," Villaraigosa said.

"This plan makes a basic promise to our kids. We are going to recycle and conserve enough water to meet 100percent of new demand."

To encourage Angelenos to save, the plan recommends ticketing water wasters, offering more financial incentives for efficient appliances and synthetic turf, and installing "smart" sprinklers that turn off when it rains.

But the groundwater reclamation is Villaraigosa's boldest proposal. Los Angeles residents and politicians soundly killed a similar project in 2000.

The proposed \$55million East Valley Water Recycling Project would have moved 3.2billion gallons of treated water from the reclamation plant in Sepulveda Basin to the Hansen Dam spreading grounds in Sun Valley.

There, the treated wastewater would have been filtered twice, mixed with other water and piped into 70,000 households.

But after the project was dubbed "toilet to tap" by opponents, the DWP suspended it under pressure from city leaders. Villaraigosa, a state assemblyman and candidate for mayor at the time, also opposed the effort to mix recycled water into drinking water.

James Hahn formally stopped the project after

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he was elected mayor in 2001.

But times have changed, Villaraigosa said Wednesday.

"This is a new day and a new plan that will deliver only the cleanest and safest water to the people of Los Angeles," the mayor said.

DWP General Manager H. David Nahai said recycled water is becoming more common. Orange County has a similar recycled water system, while residents in London, Israel and even downstream from Las Vegas all drink reclaimed water.

"We're going to do this in a completely different way," Nahai said. "We can't afford to fail at this. Our plans are very ambitious; we're talking about a sixfold increase in recycled water."

Currently, L.A.'s water-treatment plants produce 520,000 acre-feet of water per year, but only 90,000 is recycled. The rest goes into the ocean.

The mayor's plan would increase recycled water use to 140,000 acre-feet a year - enough for 280,000 households - and roughly 10percent of that would be mixed into the drinking-water supply.

Upgrading the city's wastewater-treatment plants and installing the piping needed to move recycled water could cost as much as \$1billion over the next 20 years.

To help cover the cost, Los Angeles would look

to the state and to Southern California's water wholesale agency, the Metropolitan Water District.

"The cost will be substantial, but you have to think about what the cost of inaction will be," Nahai said. "We don't have much choice."

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Water Reuse News: January 30, 2007

#### January 30, 2007

#### Aurora, CO to Increase Supply by 20% with Indirect Potable Reuse

A \$754 million water reuse project will bring recycled water to the taps of residents in Aurora, CO by 2010, according to the Denver Post. Like many of the surrounding communities, Aurora relies on snowmelt to replenish its reservoirs. This new project will extract water from the South Platte River downstream from where water is discharged from the Denver Metro Wastewater Reclamation District plant. Once the water is pulled from the river, it will be treated in a 40-day, six-step process that will include sand and charcoal filtration, chemical treatment, and ultraviolet irradiation. The purified water will be blended with the mountain snowmelt and treated again before being delivered to customers. "This is the wave of the future," said Glenn Bodnar of the Colorado Department of Public Health and Environment.



Early Registration Discounts for California Section Conference End February 9 The California Section of the WateReuse Association will hold its 2007 Annual Conference March 4-6 at the Wyndham Palm Springs Hotel in Palm Springs, CA. Early registration discounts are available until February 9. The theme is "Drought Proofing the Golden State—Sustainability in the Era of Climate Change." Presentations will include panel discussions, individual sessions, and workshops. For registration information, click here.

#### hittier Narrows Water Recycling Project Opens in Los Angeles

The Upper San Gabriel Valley Municipal Water District recently unveiled a new phase of its water recycling program-the Whittier Narrows Water Recycling Project in Los Angeles, CA. The project converted the irrigation supply for the Whittier Narrows Recreation Area to recycled water. The recreation area includes a large public park, soccer fields, baseball and softball fields, a skeet range and archery facility, as well as an 18-hole golf course.

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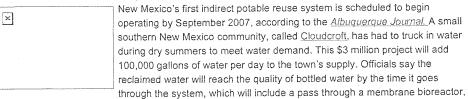
The \$9 million, two-year project involved the installation of about five miles of pipeline and the construction of a large

pump station to meet the irrigation needs of the extensive turf and landscape at the site. In the future, the project will provide service to more school and park sites as well as an additional golf course. The ribbon cutting ceremony included a host of dignitaries and agency officials such as Congresswoman Grace Napolitano (pictured), who delivered the keynote address to the estimated 300 in attendance.

#### Four Firms Hired to Build Carlsbad, CA Desalination Plant

Poseidon Resources Corporation, the developer of a proposed seawater desalination plant in Carlsbad, CA, announced the selection of a four company team to build the plant, according to a January 26 news release, Poseidon has hired American Water, Pridesa America Corporation, PBS&J, and J.R. Filanc Construction to build the plant if it is approved. Poseidon has estimated that it will cost \$270 million for construction of the plant and distribution pipes. Poseidon has received some permits for the 100 million gallon per day plant and has an application pending with the California Coastal Commission.

#### Indirect Potable Reuse Coming to New Mexico Town



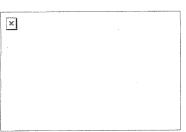
chlorination, reverse osmosis, and ultraviolet disinfection. The reclaimed water will be blended with the spring and well water the community normally uses and be treated again before it reaches local taps.

#### Rivals Find Common Ground on Arizona Desalination Plant

After sitting idle for most of the 15 years that it has been in existence, a Bureau of Reclamation desalination plant in Yuma, AZ is scheduled to begin operating in March for a 90-day test thanks to rivals coming together to find a solution, according to the Arizona Republic. The initial goal of the plant was to treat water drained from fields and send it to the Colorado River to help reduce the increasing levels of salt. The \$280 million facility operated for nine months in 1992 before being mothballed. Environmentalists have been opposed to restarting the desalter because the water that has flowed past it over the past decade and a half has helped revive a wetland that harbors some of the rarest species in the hemisphere, the article reported. The current solution began with a rafting trip where water managers, environmentalists, and journalists began discussing ideas that involved finding other water sources to reduce salt and nutrients in the Colorado River and still support the wetlands.

Desalination Plant Proposed Along New York's Hudson River United Water New York submitted plans to the New York Public Service Commission on January 16 to build a \$79 million desalination plant that would allow customers to drink water from the Hudson River, the Journal News reported. The proposed project would begin operating by 2015 and provide up to 7.5 million gallons of water per day. United Water officials say that a

desalination plant is more cost effective than its previous plan of building a reservoir to address long-term water supply needs.



Some community activists have expressed concerns about pollutants in the water, energy costs, and impacts on the ecosystem.

#### Foundation Accepting Abstracts for Annual Research Conference

The WateReuse Foundation is accepting abstracts for technical presentations during the 11th Annual Water Reuse Research Conference to be held June 4-5 in El Paso, TX. Abstracts are due February 16. The Foundation's Research Conference is dedicated to showcasing the latest results of "cutting-edge" research on water reuse and desalination. This conference typically showcases what will likely become the mainstream, accepted technologies in coming years.

#### Florida Community Considers Reclaimed Water Option

A northern Florida community has authorized a two-month, \$19,000 study to explore the costs and demand for a new reclaimed water system, according to the Gainesville Sun. Newberry, FL currently uses reclaimed water in spray-field irrigation, but officials have decided to study piping reclaimed water to irrigate new housing developments, city buildings, schools, and businesses. The Suwannee River Water Management District has a grant that would cover up to 75% of the cost, which is projected to be about \$5 million.

#### WateReuse Florida Launches New Website ×

WateReuse Florida, the newest state section of the WateReuse Association, has launched a new website to better serve Florida's water reuse and desalination communities. WateReuse sections complement the national organization with their ability to focus on unique legislative, regulatory, and funding issues in a given state. To visit

WateReuse Florida online, click here.

#### Foundation Seeks Innovative Research Ideas

The WateReuse Foundation is seeking preproposals for funding consideration under its 2007 Unsolicited Research Program. The Unsolicited Research Program promotes applied research through projects proposed by researchers. Unsolicited research projects typically address emerging issues and involve

original concepts, novel techniques, and other scientific research needs. Preproposals are due by February 20, 2007.

#### Study: Recycled Drinking Water Quality Meets or Exceeds Traditional Sources

A review of recycled drinking water projects in the United States and Singapore by Australian researchers found no evidence of related health problems, according to the <u>Courier Mail</u>. The report by Stuart Khan and David Rosser, of the University of New South Wales, found recycled drinking water in the United States and Singapore to be of equal quality to that from traditional sources, and in some cases better. The study was commissioned by the Local Government Association of Queensland, where a referendum will be held March 17 to decide if the community will proceed with a proposed indirect potable reuse project.

#### A Case for Wider Adoption of Water Recycling in India

Faced with widespread water shortages, India will need to move toward water recycling in residential complexes, offices, malls, and factories to meet water supply needs argues one of the country's leading water professionals in an interview recently published in the *Indian Express*. Sanjay Nayyar, Business Head of the Waste Water Technologies division of the Acme Group, says the growing shortage of water and the consequent pressure on ground water will make water recycling an important part of India's future. Hotels, malls, and large apartment complexes operate their own wastewater treatment facilities under new Indian regulations. Nayyar says the government could further advance water recycling by offering incentives for new projects.

#### Recycled Water Important in Australia's Future

Recycled water will play an increasingly important part in securing the reliability of Australia's urban water supplies, according to a position paper recently released by the Water Services Association of Australia (WSAA). The paper, entitled "Refilling the Glass: Exploring the Issues Surrounding Water Recycling," was released in Parliament House, Canberra in late November 2006 by the Parliament. Some of the key observations in the paper include the need to consider costs and benefits of recycled water options on a case-by-case basis, a projected growth in the use of recycled water, and discussion of the growing public acceptance of using recycled water for nondrinking purposes. The WSAA report also indicates that a greater impact could be made on consumption needs if recycled water is used to supplement drinking water supplies, but cautions that extensive discussions with the community will be required to ensure there is common understanding of the issues involved. To view the complete paper online, click here.



Comments P | Recommended &

## Proposal to mix Lake Arrowhead with recycled wastewater resurfaces

Download story podcast

10:00 PM PST on Tuesday, November 13, 2007

By DUANE W. GANG The Press-Enterprise

The water utility that serves Lake Arrowhead is again considering a plan to store recycled wastewater in the lake, a move that is likely to reopen fierce public debate on whether the move is viable.

The Lake Arrowhead Community Services District sent letters last week to two state agencies seeking information on requirements needed to gain approval for the plan.

If successful, Lake Arrowhead could become the first place in the state where recycled wastewater is mixed with lake water that eventually makes its way into the community's drinking supply.

The mountain community has long struggled with ways to meet the demand for drinking and irrigation water and protect Lake Arrowhead for recreation. The utility is under a state order to limit the amount drawn from the lake each year.

To meet a growing demand, the utility studied new water sources, including storing recycled water in the lake, called indirect potable reuse.

"We have done a demonstration and proved we could produce a water of better quality, in all respects, than the water actually stored in Lake Arrowhead," said Ralph Wagner, the founding president of the Arrowhead Lake Association and an incoming member of the utility's board of directors.

"Now, all we have to do is convince the people it would be a worthwhile thing."

UCLA conducted a recycled water test program in the mid 1990s at Lake Arrowhead.

In a Nov. 8 letter to the state Regional Water Quality Control Board in Victorville, district engineer Ryan Gross said the plan calls for about 1,300 acre feet of water, or about 1.5 million gallons per day, to be stored in the lake. It would enter Lake Arrowhead on its western edge and mix with lake water.

The utility would move the recycled water into the lake after it is treated to levels that meet or exceed all drinking water standards, Gross wrote.

Wagner said any move to put recycled water into the lake could still be a decade away.

But opposition is likely to surface. In 2005, it became a major issue in elections for the utility's board. Wagner said public perception is the biggest obstacle to overcome.

Ted Heyck, the board president who lost his bid for re-election this month, said he sees water quality and legal problems with the plan.

"It is the biggest hoodwink you have ever seen," he said.

Heyck said he doesn't believe the utility will be able to get permission.

"The state has not permitted anybody to put water into the lake. It has only allowed people to take water from the lake," Heyck said.

Heyck has long criticized the utility and filed the complaint with the State Water Resources Control Board that led to a 2005 order limiting the draw from the lake to 1,566 acre feet of water per year.

It is unclear whether adding water to the lake would allow the utility to withdraw more than the state order allows.

Wagner said he believes the state order applies to water coming into the lake naturally. If recycled water is added, the utility could take more from the lake, Wagner said.

In addition, recycled water could be used to maintain the lake's level, he said.

Wagner said the water quality control board and state Department of Public Health would have to sign off on the plan.

Already, the utility is spending about \$12 million to set up a system to recycle water for irrigation. A plan to treat water to a higher quality and store it in the lake could cost another \$8 million, Wagner said.

Reach Duane W. Gang at 951-368-9547 or dgang@PE.com

THE CITY OF SALL DE



## MANAGER'S REPORT

DATE ISSUED:

November 18, 1996

REPORT NO. 96-243

ATTENTION:

Natural Resources and Culture Committee

Agenda of November 21, 1996

SUBJECT:

Water Repurification Project

REFERENCE:

City Manager's Report No. 95-273, Issued November 15, 1995

#### · <u>SUMMARY</u>

<u>Issue</u> - What actions shall the City Council take regarding the status of the Water Repurification Project?

<u>Manager's Recommendation</u> - Direct staff to continue with the planning, design, environmental work and funding of the Water Repurification Project as outlined in this report.

Other Recommendations - None

<u>Fiscal Impact</u> - None. This action supports completing work that has previously been contracted for or will be approved by the City Council under separate actions. No new funding is required by this action.

#### BACKGROUND

The City of San Diego has been pursuing the concept of repurifying water, through research and health effects studies, since the 1970's. Water Repurification is a process whereby reclaimed water (water that has already been treated to a level suitable for irrigation and other non-potable uses) is further treated to a quality that meets or exceeds all drinking water standards.

The 1992 Health Effects Study for the AQUA II Project (Aquaculture Facility in Mission Valley) documented that the health risk associated with the use of that water was less than or equal to the use of the existing raw water supply. Based on these results the San Diego County Water Authority (CWA) and the City began actively pursuing the Water Repurification Project in 1993. The California Department of Health Services (DHS)

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requested a detailed feasibility study be prepared. In 1994, the City Council, by R-285070, approved the preparation of the Feasibility Study that was eventually submitted to, and approved by, the DHS in August 1994. During this time period an extensive public outreach and education process was conducted. A Repurified Water Review Committee (RWRC) was formed with representatives from the health, medical, and industry fields as well as environmental and community groups. The RWRC's final report supported the project as a supplemental water supply. In addition, an Independent Advisory Committee (IAC), made up of renowned water and health experts, also supported the Water Repurification Project.

Subsequent to the DHS conditional approval of the project in August 1994 the City Council, by R-286852, approved the preparation of planning studies for the project. These included the 1995 Siting Study Report and the 1996 Project Report. In the summer of 1995 a pilot test of the proposed treatment system was conducted at the San Pasqual Reclamation Facility. This test provided documentation to the DHS that the Water Repurification System, as proposed, could reliably produce a safe drinking water product. In February 1996 the City Council, by R-286779, approved the preparation of a joint EIR/EIS for the project. This work is well underway. City staff have just begun an in-depth pilot test of the Repurification System comparing the performance of all available Advanced Water Treatment (AWT) equipment. This prequalification program will document system performance, help define permit requirements and develop a shortlist of competitors for bidding on the project. In August 1996 the City Council, by R-287753, approved the initiation of design for the AWT Facility.

#### DISCUSSION

The 30 MGD North City Water Reclamation Plant (NCWRP) is nearing completion, and the Reclaimed Water Distribution System (RWDS) is under construction. Pursuant to the May 10, 1995 clarifying order to the Interim Order: <u>U.S.A. v. City of San Diego</u> - Case No. 88-1101-B (LSP) the RWDS is defined as an 8,700 acre-feet per year (AFY) system. This size system was developed as the economically "optimized" distribution system in 1995. The repurification concept was then merged with the RWDS via an integrated analysis in an attempt to determine the most cost effective way of disposing of, or beneficially reusing all of the effluent from the NCWRP. Repurifying the water and delivering it to the San Vicente Reservoir for potable use will not only minimize the need for double treatment (effluent from NCWRP not beneficially reused would be sent to Point Loma for redundant treatment), but is a more cost effective solution to other effluent reuse/disposal options (e.g. an expanded RWDS). The Water Repurification Project, in conjunction with the "optimized" RWDS, is expected to have a total yield of 23,700 AFY.

The responsibility lies with the Metropolitan Wastewater Department (MWWD) to dispose of the NCWRP effluent either through reuse or ocean discharge. The Water Repurification Project provides a cost effective system-wide method for handling the majority of the effluent and allows the sewer fund to receive a return on its capital investment via water

sales, CWA and MWD incentive payments, and Bureau of Reclamation and Environmental Protection Agency grant receipts.

All City funding for this project to date has been from the water revenue fund. In the near future a financing plan, utilizing sewer revenue funds, will be brought to Council to support future activities.

A companion item to this action is approval for the initiation of design of the repurified water conveyance system from the AWT to the San Vicente Reservoir. It is essential that the design of the conveyance system be started to support the environmental documentation for this project. The design services for this project will be expressly limited to include only those services which are absolutely necessary to permit completion of the environmental review of the proposed project.

#### CONCLUSION

Based on the extensive public outreach program it is clear that the citizenry has a strong appreciation of the fact that potable water is a scarce commodity and that it is important to identify reliable, cost effective, local sources of water. The Water Repurification concept is acceptable to most audiences when current water sources and treatment processes are explained. It has recently received very positive coverage by local news stations, each of which summarized the technology, did a taste test, and concluded that Water Repurification is an idea whose time has come.

The Water Repurification Project is supported by the California DHS, San Diego County Medical Society, Sierra Club, the State Water Resources Control Board, the EPA and the Bureau of Reclamation. The optimized repurification/reclamation system proposed is the most cost effective manner to manage the effluent produced at the NCWRP. Therefore the Manager requests Council direction to continue with the planning, limited design, environmental work and funding for this project.

Respectfully submitted,

Approved: COLEMAN CONRAD

Deputy City Manager

Submitted by: F.D. SCHLESINGER

Director, Metropolitan Wastewater Department

SCHLESINGER/ETB/PG [k:\wzh\vdg61002.rpt]

# Exhibit 19

#### RESOLUTION NUMBER R-285070 ADOPTED ON DECEMBER 5, 1994

BE IT RESOLVED, by the Council of The City of San Diego, that the Fiscal Year 1995 Capital Improvements Program budget is hereby modified by adding CIP No. 70-936.0, Water Repurification Program.

BE IT FURTHER RESOLVED, that the City Manager is hereby authorized and empowered to execute, for and on behalf of said City, an agreement with Montgomery Watson Americas, Inc., for Phase 2 work associated with the Water Repurification Program in an amount not to exceed \$950,000, under the terms and conditions set forth in the Agreement on file in the office of the City Clerk as Document No. RR-285070-1, together with any reasonably necessary modifications or amendments thereto which do not increase project scope or cost and which the City Manager shall deem necessary from time to time in order to carry out the purposes and intent of this project and agreement.

BE IT FURTHER RESOLVED, that the City Auditor and Comptroller is hereby authorized to transfer an amount not to exceed \$589,000 within Fund 41500, from CIP No. 70-925.0, Mission Bay East Subsystem, to CIP No. 70-936.0, Water Repurification Program, and to transfer an amount not to exceed \$500,000 within Fund 41500, from CIP No. 70-926.0, Mission Bay Park Retrofit, to CIP No. 70-936.0, Water Repurification Program.

BE IT FURTHER RESOLVED, that the expenditure of an amount not to exceed \$950,000 from Fund 41500, CIP No. 70-936.0, Water Repurification Program, is hereby authorized, solely and exclusively to provide funds for the above agreement.

BE IT FURTHER RESOLVED, that the expenditure of an amount not to exceed \$139,000 from CIP No. 70-936.0, Water Repurification Program, is hereby authorized, solely and exclusively, is hereby authorized, solely and exclusively to reimburse costs incurred by Sewer Fund 41509 related to Phase 1 of this project.

BE IT FURTHER RESOLVED, that the City Manager is hereby authorized and empowered to execute, for and on behalf of said City, a joint participation agreement with the San Diego County Water Authority for reimbursement of up to 50% and not more than \$250,000 of total incurred costs, less contributions from other agencies, for Phase 1 and Phase 2 of the Water Repurification Program, under the terms and conditions set forth in the Joint Participation Agreement on file in the

office of the City Clerk as Document No. RR-285070-2, together with any reasonably necessary modifications or amendments thereto which do not increase project scope or cost and which the City Manager shall deem necessary from time to time in order to carry out the purposes and intent of this project and agreement.

BE IT FURTHER RESOLVED, that the City Manager is authorized and empowered to execute, for and on behalf of said City, a joint participation agreement with the Metropolitan Water District, via the San Diego County Water Authority, for reimbursement of an amount not to exceed \$100,000 for costs associated with the Phase 2 of the Water Repurification Program, under the terms and conditions set forth in the Joint Participation Agreement on file in the office of the City Clerk as Document No. RR-285070-3, together with any reasonably necessary modifications or amendments thereto which do not increase project scope or cost and which the City Manager shall deem necessary from time to time in order to carry out the purposes and intent of this project and agreement.

APPROVED: JOHN W. WITT, City Attorney
By
Frederick M. Ortlieb
Deputy City Attorney
FMO:mb
11/22/94
Aud.Cert:9500589
Or.Dept:W.Util.
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(R-97-626)

#### **RESOLUTION NUMBER R-288181**

#### ADOPTED ON DECEMBER 9 1996

BE IT RESOLVED, by the Council of The City of San Diego, that the City Manager is directed to continue with the planning, design, environmental work and funding of the Water Repurification Project as outlined in City Manager's Report No. 96-243, dated November 18, 1996, a copy of which is on file in the office of the City Clerk as Document No. RR-288181

APPROVED: CASEY GWINN, City Attorney

Ву \_\_\_\_\_

Stuart H. Swett Deputy City Attorney

SHS:smf 12/03/96 Or.Dept:NRC R-97-626 Form=r-t.res The additional 20-mgd expansion brings the plant to full buildout capacity of 60 mgd. Construction for the Otay plant expansion is anticipated to be completed in FY2011. The approximate construction cost of the expansion is \$13 million.

- Purchase of CWA filtered water to meet peak period demands for as long as possible while the City's treatment plants expansions are constructed.
- A programmatic directive to the City staff to work with CWA staff to identify and pursue mutually beneficial projects and regional planning.
- Reclamation projects including: the North City Water Reclamation Plant and the optimized North City RWDS (19.4 mgd maximum day), scheduled for completion in 1997; and the South Bay Water Reclamation Plant, which is scheduled to begin production of reclaimed water in FY2002 with a 6.7-mgd maximum day capacity by FY2011. A third water reclamation facility, the Central plant, is proposed to be fully operational by FY2010. These projects will meet 1994 Ocean Pollution Reduction Act requirements for 45 mgd of reclaimed water system capacity by 2010.
- The North City Repurification Project (13.4 mgd). Construction of the repurification plant is proposed to be completed in FY2002. Water from the repurification plant will be piped to the San Vicente Reservoir, from where, after a prescribed detention time, it will be used with other untreated water as a source of potable supply for subsequent water treatment.
- Ongoing consideration of other water supply options such as groundwater, desalination and gray water.

The above set of options is preferred for meeting forecast water demands because it fulfils the City's mandate for water reuse and decreases reliance on imported supplies. The options above address the City's treatment capacity needs. Net maximum day potable water demands are projected to be 356 mgd by the year 2015, a rate which exceeds the City's current treatment capacity of 300 mgd. Maximum use period demands are currently met through the purchase of filtered water from the CWA. This alternative increases the potable water treatment capacity within the city, which obviates the need to purchase imported filtered water once the new plant capacity is on line. The new capacity is anticipated to meet or exceed net potable water demands on a dry year maximum day at the end of the planning period in 2015. In addition, the Preferred Alternative provides for efficient water use by increasing the level of conservation, a proven demand management option for the City. The total capital cost of the Preferred Alternative in 1997 dollars is \$773 million through 2006. Figure 8-1 illustrates how the Preferred Alternative meets forecast maximum demands. For a detailed presentation of how this set of options meets forecast maximum day demands over the planning period, see Appendix G, Tables 9a-9b.



reclaimed water use, specifically in the winter. Producing repurified water from the reclaimed water allows for beneficial use of water that may otherwise be wasted. As part of the North City optimized reuse system, the average cost of repurified water will be \$742 per acre-foot<sup>1</sup>.

### 5.6.2 Repurified Water Options

The repurification project being considered as a supply option would utilize a portion of the North City Water Reclamation Plant effluent as a supply source. The repurified water would be transported by pipeline from the AWTP to the San Vicente Reservoir for mixing with surface water. The water would have a residence time of approximately one year in the reservoir before being used as a drinking water supply source.

If approved, construction of the repurification project would begin in 1999, with the fully operating plant producing repurified water in FY2002. The estimated repurified water production would be approximately 13.5 mgd on an annual basis (15,000 AFY), with daily flows varying depending on reclaimed water irrigation supply need. The estimated capital cost of the repurification project is \$125 million, which includes the AWTP and the conveyance system.

### 5.6.3 Options for Further Study

At present, the AWTP facility at the North City plant is the only repurification project planned in the City. There are no current plans for repurification at the Central or South Bay reclamation locations, although these could be candidates for future repurification projects.

### 5.7 Groundwater

### 5.7.1 Background

Groundwater is a local source of water available for both annual or dry weather use. Groundwater management is very similar to management of water in a surface water reservoir, storing water during wet periods and draining water from storage in dry years when other sources of water may not be available.

Groundwater is extracted through wells drilled in areas where water is present, available, and of suitable quality. As water is pumped from the ground, natural recharge from rivers or adjacent areas replaces the water being pumped. If the annual pumping from a well is equal to the amount of groundwater recharge, the groundwater level will remain at approximately the same elevation. If pumping from the well consistently exceeds the natural recharge, an overdraft condition can occur. Groundwater use can also be managed by allowing overdraft to occur in dry years with the expectation that recharge will occur naturally or be implemented in wet years by artificial recharge projects.

Groundwater availability in the study area, however, is quite limited with respect to total water needs. As compared to other supply options, the maximum groundwater production possible is only a small percentage of the total overall water budget for the San Diego area.

<sup>&</sup>lt;sup>1</sup> Estimated cost as of August, 1996. Costs will be refined as project is developed further.



### RESOLUTION NUMBER R-287753 ADOPTED ON AUGUST 5, 1996

BE IT RESOLVED, by the Council of The City of San Diego, that the City Manager be and he is hereby authorized and empowered to execute, for and on behalf of said City, an agreement with Malcolm Pirnie, Inc., for design services for the Advanced Water Treatment Plant-Water Repurification Project, CIP No. 70-936.0, under the terms and conditions set forth in the Agreement on file in the office of the City Clerk as Document No. RR-287753, together with any reasonably necessary modifications or amendments thereto which do not increase project scope or cost and which the City Manager shall deem necessary from time to time in order to carry out the purposes and intent of this project and agreement.

BE IT FURTHER RESOLVED, that the City Auditor and Comptroller is hereby authorized to transfer an amount not to exceed \$300,000 from CIP 70-912.0, Miramar Road Subsystem to CIP 70-936.0, Water Repurification Project.

BE IT FURTHER RESOLVED, that the City Auditor and Comptroller is hereby authorized to transfer an amount not to exceed \$200,000 from CIP 70-918.0, Scripps Ranch Blvd./I-15 Subsystem to CIP 70-936.0, Water Repurification Project.

BE IT FURTHER RESOLVED, that the expenditure of an amount not to exceed \$500,000, from fund 41500, CIP No. 70-936.0 for the

first phase only of the Malcolm Pirnie, Inc. contract for project design, said phase to commence with the Notice to Proceed and run through January 1997, is hereby authorized, solely and exclusively for the purpose of providing funds for the above project.

BE IT FURTHER RESOLVED, that the City Manager establish additional contract funding phases with Malcolm Pirnie, Inc., and that he is hereby authorized to execute a contract with Malcolm Pirnie, Inc. provided that the City Auditor first furnishes one or more certificates demonstrating that the funds necessary for expenditure under said contract are, or will be, on deposit in the City Treasury.

APPROVED: JOHN W. WITT, City Attorney

Ву

Frederick M. Ortlieb Deputy City Attorney

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### RESOLUTION NUMBER R-288182 ADOPTED ON DECEMBER 9, 1996

BE IT RESOLVED, by the Council of The City of San Diego, that the City Manager is hereby authorized and empowered to execute, for and on behalf of said City, an agreement with Boyle Engineering Corporation for design services in connection with the Repurified Water Conveyance System - Water Repurification Project, under the terms and conditions set forth in the Agreement on file in the office of the City Clerk as Document No RR-288182, together with any reasonably necessary modifications or amendments thereto which do not increase this project's scope or cost and which the City Manager shall deem necessary from time to time in order to carry out the purposes and intent of this project and agreement.

BE IT FURTHER RESOLVED, that the City Auditor and Comptroller is hereby authorized to transfer an amount not to exceed \$300,000 from CIP No. 70-916.0, Miramar Road Subsystem Extension, and an amount not to exceed \$200,000 from CIP No. 70-911.0, Genesse Avenue Subsystem, both to CIP No. 70-936.0, Water Repurification Project.

BE IT FURTHER RESOLVED, that the expenditure of an amount not to exceed \$500,00 from Fund 41500, CIP No. 70-936.0, Water Repurification Project, is hereby authorized, solely and exclusively to fund the first phase of this agreement, said phase to commence with Notice to Proceed and run through January 1997.

BE IT FURTHER RESOLVED, that the City Manager is hereby authorized to establish additional contract funding phases with Boyle Engineering Corporation and to execute a contract

with Boyle Engineering Corporation, provided that City Auditor and Comptroller first furnishes one or more certificates demonstrating that the funds necessary for expenditure under said contract are, or will be, on deposit in the City Treasury.

APPROVED: JOHN W. WITT, City Attorney

Stuart H. Swett
Head Deputy City Attorney

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#### RESOLUTION NUMBER R-286779 ADOPTED ON JANUARY 8, 1996

BE IT RESOLVED, by the Council of The City of San Diego, that the City Manager is authorized and empowered to execute, for and on behalf of said City, an agreement with Tetra Tech, Inc., for environmental consulting services associated with the preparation of an environmental impact report/environmental impact statement for the water repurification project, under the terms and conditions set forth in the Agreement on file in the office of the City Clerk as Document Number RR-286779, as well as any reasonably necessary modifications or amendments thereto which do not increase this project's scope or cost and which the City Manager shall deem necessary from time to time in order to carry out the purposes and intent of this project and agreement.

BE IT FURTHER RESOLVED, that the expenditure of an amount not to exceed \$949,260 from Fund No. 41500, CIP No. 70-936.0, Water Repurification Program, is hereby authorized, solely and exclusively to provide funds for the above agreement.

APPROVED: JOHN W. WITT, City Attorney
By
Ted Bromfield
Chief Deputy City Attorney
TB:mb
12/08/95
Aud.Cert:9600635
Or.Dept:W.Util.
R-96-706

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#### DEPARTMENT OF HEALTH SERVICES

714/744 P STREET P.O. BOX 942732 SACRAMENTO, CA 94234-7320 (916) 322-2308



October 25, 1996

The Honorable Susan Golding Mayor of San Diego 202 C Street San Diego, CA 92101

Dear Mayor Golding:

I am writing with regard to the City of San Diego's Water Purification Project that proposes to use highly treated wastewater to augment San Vicente Reservoir which is a source of drinking water for the City.

As the agency responsible for regulating public water systems in California, the Department of Health Services has been working closely with the City on this project. The project will be the first planned indirect potable use of repurified water in the United States. Therefore, it must provide the highest level of public health protection and meet the most stringent reliability criteria to ensure that the citizens of San Diego receive a continuous supply of safe drinking water. The project that is being proposed meets these standards and will serve as the model for similar projects in the future.

We also recognize that there is an increasing demand being placed on the State's limited water resources particularly in Southern California. We, therefore, commend the City for the effort being made to maximize the use of all available sources of water while maintaining as the primary goal the protection of the health of its citizens.

Sincerely,

David P. Spath, Ph.D., Chief Division of Drinking Water and Environmental Management

R-28-RADE



#### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street San Francisco, CA 94105-3901

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FEB - 6 1995

Patsy Tennyson San Diego County Water Authority 3211 Fifth Avenue San Diego, CA 92103

Dear Ms. Tennyson:

Thank you for the invitation to attend the February 7 special media briefing on your water repurification project. Although I am not available to attend the briefing, I want you to know you have the full support of EPA in your pursuit of this project. If there is anything we can do to help you move the project through this next study phase and on to implementation, please let us know.

For some time, EPA has advocated water reuse as a safe, reliable alternative water supply. The more water we can reuse, the more water we can provide to protect sensitive ecosystems such as the San Francisco Bay-Delta, and Mono Lake, and begin to restore the important California ecosystems and fisheries that are currently in danger. In addition, we can reduce discharges to the ocean environment. From the local perspective, water reuse can provide a reliable local source of water that is essentially "drought-proof," and is not subject to the uncertainties that surround San Diego's main source of supply, imported water.

EPA's commitment to water reuse in the San Diego area is underlined by our contribution of over \$80 million in federal funds for the North City Water Reclamation Plant. In addition, we have recently processed a \$5.7 million planning grant specifically for the water repurification project. We look forward to continuing to support water reuse planning and implementation in the San Diego area.

The San Diego water repurification project represents the next logical step in water resources management in California. As currently planned, we have full confidence that the water repurification project will provide a safe, reliable source water for potable uses. The technology that San Diego is planning to use provides multiple barriers that have been shown to reliably provide a very high quality source water. I am hopeful that San Diego's water repurification project will be successful, and will open the door for other communities to consider this important water reuse option.

Sincerely,

Alexis Strauss

K- where are A- where

Acting Director, Water Management Division

Printed on Recycled Paper



February 1, 1995

Lester Snow, General Manager San Diego Water Authority 3211 Fifth Avenue San Diego, CA 92103

Dear Mr. Snow:

As the Medical Society representative to the San Diego County Water Authority study of repurification of the water supply, it is my pleasure to heartily endorse the study and successful operation of the water repurification process that the County Water Authority plans.

For well over a year now, it has been my pleasure to meet with experts from the County Water Authority and to read extensively from the resources provided me. In addition, I have checked with a number of medical experts interested in water purification and our water supply in general. I have also had the pleasure of overseeing the California Medical Association's Committee on Environmental Health for a number of years in the past.

Based on my own interest and the extensive resources provided me, I feel confident that this is not only a safe, but an exciting project for San Diego County. We must look to new and safe ways to provide enhanced resources for our citizenry and we all appreciate how precious water is to our communities. This study is timely and invaluable for the future of San Diego County. It is my belief that this is an extraordinarily safe procedure and is worthy of this very conservative approach to instituting the repurification process.

I am impressed with the length and breadth of the efforts that the County Water Authority has taken to research this process, and to meet with an extensive array of experts and interested members of the community. I commend Mr. MacLaughlin and the other leaders of our Water Authority for the extremely professional and scientific manner in which this repurification process was investigated and brought to the attention of the many interested members of our community.

So, in summary, I heartily endorse the water repurification process that is to be undertaken by the San Diego County Water Authority. It will be my pleasure to follow the progress of the study and the implementation of the successful operation of this repurification for a long time to come.

Sincerely,

cc:

Rosemarie Marshall Johnson, M.D.

Immediate Past President

Susan Golding, Mayor
3702 Ruffin Road San Diega. CA 92123-1812 PO Box 23581 San Diega. CA 92193-3581 Phone G19.565.8888 Fax 619.569.1334

#### STATE WATER RESOURCES CONTROL BOARD

PAUL R. BONDERSON BUILDING 901 P STREET P.O. BOX 100 SACRAMENTO, CALIFORNIA 95812-0100 (916) 657-09335 FAX (916) 657-0932



February 6, 1995

Mr. Lester A. Snow, General Manager San Diego County Water Authority 3211 Fifth Avenue San Diego, CA 92103

Dear Mr. Snow:

Although the historic agreement between the State of California and the federal government to protect the sensitive ecology of the San Francisco-Sacramento Bay Delta has created more certainty in our water supply, it has also reinforced the need to continue to thoroughly explore all viable local water resource options. Efforts taking place in San Diego County and elsewhere in southern California to beneficially reuse reclaimed water, implement aggressive water conservation, and recover brackish groundwater resources are reducing the need to export water through the Delta and contributing to a more reliable water supply for the state as a whole.

The water repurification project that the San Diego County Water Authority and the City of San Diego are investigating is a perfect example of a local water resource that is extremely dependable and has the opportunity to create a new water resource of great importance to the State of California. Given the successful history in California for repurified water for groundwater recharge, this is the next logical step in managing California's precious water resources.

The State Water Resources Control Board has followed this concept closely for the last two decades and has been a financial participant in the City of San Diego's Aquaculture II studies. Those studies and others demonstrated the high quality and safe nature of this water supply. In developing this specific project, I recognize that the San Diego County Water Authority and the City of San Diego have gone to great lengths to ensure a cautious and conservative approach to water repurification that ensures the protection of the public health.

R- ZHATAT

I look forward to working closely with you in the ongoing development of this exciting project.

Sincerely,

Marc Del Piero Board Member 5



### SIERRA CLUB, SAN DIEGO CHAPTER

San Diego & Imperial Counties 3820 Ray Street San Diego, CA 92104-3623

© Office/Bookstore 619 299-1743 Conservation 619 299-1741 Fax 619 299-1742

February 6, 1995

Mr. Lester Snow General Manager San Diego County Water Authority 3211 Fifth Ave. San Diego, CA 92103

Subject: Sierra Club, San Diego Support for Continued Evaluation of Water Repurification

Dear Mir. Snow:

For several decades the Sierra Club has been a strong advocate for water recycling and reuse. Throughout most of California, water is a precious and scarce resource. This is especially true in the southern half of the state. We cannot afford to use water just once and throw it away. Water recycling offers a new, affordable and largely undeveloped source of water that will not be impacted by drought conditions. An adequate, reliable and cost effective supply of water is important to both business and residential rate payers in San Diego.

The San Diego Chapter of the Sierra Club has been honored to participate with the County Water Authority's citizens advisory Repurified Water Review Committee. We believe that nearly all the parties who were involved are pleased with the results of the Committee's efforts. Water repurification has both environmental and economic advantages over conventional wastewater recycling methods. Water repurification offers a second recycling option which avoids many of the difficult environmental and economic problems encountered with conventional water reclamation. With water repurification we can avoid the necessity for replumbing large sections of our city with dual pipelines, and we may not need to construct new reservoirs solely for the winter storage of non-potable, reclaimed water supplies. Furthermore, increased water reclamation and repurification will reduce stresses on the ocean environment resulting from large volume marine discharge of municipal and industrial sewage.

During the Summer of 1994, before the County Water Authority's Repurification Committee had completed its review, the Sierra Club Executive Committee endorsed the water repurification plan, subject to: 1) the Repurification Committee findings that the plan was both safe and economically feasible; and 2) the approval by independent, non-governmental health experts. During the course of the

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### United States Department of the Interior

BUREAU OF RECLAMATION

Southern California Area Office P.O. Box 849 Temecula, California 92593-001

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Mr. Lester Snow General Manager San Diego County Water Authority 3211 Fifth Avenue San Diego CA 92103-0511

Dear Mr. Snow: ...

The wise management of water resources is of prime importance to the Bureau of Reclamation. As the demand for water continues to increase in Southern California, it is apparent that traditional imported supplies from the Colorado River and other regions within the State of California will be insufficient to meet future needs. Therefore, it is essential that both imported and local water resources be managed very carefully to ensure the availability of adequate water supplies. Water conservation and water recycling must be included in any water management plan if it is to be successful.

Reclamation is pleased to assist water agencies in managing their water resources. Under the authority of Title 16 of Public Law 102-575, Reclamation can provide up to 25 percent of the funds required for planning, designing, and constructing water recycling projects that will result in decreasing the demand for imported water, enhancing the environment, and providing safe, reliable supplemental water supplies for the local area.

The San Diego Water Repurification Project is the most unique and innovative water recycling project in Southern California. By using state-of-the-art processes to treat recycled water to meet or exceed stringent potable water standards, the repurified water will be safely blended with imported water in order to augment water supplies. The City of San Diego and the San Diego County Water Authority are to be commended for their efforts to pioneer this technology.

In accordance with P.L. 102-575, I am pleased to inform you that Reclamation intends to fund 25 percent of the total costs of the Repurification Project. The first step, a grant agreement to fund 25 percent of the currently ongoing planning studies, should be executed this week. We look forward to continuing our support for this important project by working with the City and the County Water Authority for years to come.

ACTING

Timothy J. Ulrich

Area Manager

R-DATES A. MARGON

**RESOLUTION NUMBER R-291210** 

ADOPTED ON JANUARY 19, 1999

BE IT RESOLVED, by the Council of The City of San Diego, that, consistent with the

Sewer Revenue and Financing Plan previously adopted by City Council on October 10, 1995, the

City Manager be and he is hereby directed to increase sewer service charges by 5 percent for

three years, as noted in Alternative 1, City Manager Report No. 99-11, in order to meet public

health and safety needs, as well as mandated construction schedules. The increase for 1999 shall

be effective sixty days from January 19, 1999, which is the date of this action, and the remaining

two increases shall be effective March 1, 2000 and March 1, 2001, respectively.

BE IT FURTHER RESOLVED, that the City Manager is directed not to spend any

monies on water repurification. In addition, the City Manager is not to spend any monies from

the Beneficial Reuse Project, 5A of Attachment A and B of City Manager Report No. 99-11, on

water reuse/reclamation until such options are evaluated and City Council direction is given.

Pending such direction, sewer revenue funds now in the Beneficial Reuse Project may be used as

needed for rate stabilization, for debt service coverage, or for infrastructure improvement.

BE IT FURTHER RESOLVED, that the City Manager is directed to review and evaluate

the creation, expansion, or modification of a public advisory group to advise the Mayor and City

Council on wastewater rates and infrastructure improvements.

APPROVED: CASEY GWINN, City Attorney

By

Ted Bromfield Deputy City Attorney

-PAGE 1 OF 2-

JM:TB:pev:mb 12/15/98 1/7/99 1/22/99 Revised Aud.Cert:N/A R-99-708 Form=r-t.frm

#### UNION-TRIBUNE EDITORIAL

### No toilet-to-tap

#### Special water rate hike unwarranted

September 8, 2008

High gasoline prices, rising food costs and upwardly adjustable mortgage payments may be sapping your paycheck, but they have not deterred the City Council from voting today on a special water rate hike for the infamous toilet-to-tap scheme.

At issue is an untested process to take sewage effluent, treat it heavily and then dump it into the San Vicente Reservoir, the source of much of San Diego's drinking water. This would mean, quite literally, taking your toilet water and returning it to your tap. Yet advocates of the plan abhor the apt toilet-to-tap sobriquet, preferring instead to call it "indirect potable reuse."

But no matter what euphemism you employ, the project is a colossal waste of ratepayer dollars and, just as important, fraught with serious public health concerns.

Over Mayor Jerry Sanders' well-justified veto, the City Council is rushing head long to build a \$12 million toilet-to-tap demonstration plant that may or may not meet the approval of the California Department of Health, which must sign off on it. Toward that end, the City Council will vote today on a special water rate increase of 2.3 percent. For the typical homeowner, who already has been hit by a string of water and sewage increases in recent years, the toilet-to-tap assessment would amount to another \$15 a year.

And what would beleaguered ratepayers get for this costly outlay? Provided the Department of Health OKs mixing the demonstration plant's output with potable supplies in the San Vicente Reservoir, the \$12 million project would produce a trifling 1,121 acre-feet of water annually. This would be less than one-half of 1 percent of the city's annual water consumption of 245,000 acre-feet.

Meanwhile, however, even as the City Council promotes the toilet-to-tap experiment, the city is dumping into the Pacific Ocean each year up to 19,000 acre-feet of reclaimed water that is perfectly suitable for landscaping and other irrigation. This is because, under terms of a court settlement, the city must reclaim the water at the North City reclamation plant, but it has never built an adequate network of purple pipes to deliver the water to customers for outdoor use. Believe it or not, then, the city is wasting nearly 20 times as much relatively cheap reclaimed water as the hugely expensive toilet-to-tap project would produce.

A far more sensible approach would be to spend the money to extend the purple pipes and thereby produce a much larger and much cheaper supply of water than that of the toilet-to-tap scheme. But the City Council is so stubbornly fixated on the toilet-to-tap idea that it steadfastly ignores the cheaper source of reclaimed water being dumped into the ocean from the North City reclamation plan.

In a key study, the respected National Research Council has warned that converting toilet water to tap water should be done only as "an option of last resort" because "many uncertainties are associated with assessing the potential health risks of drinking reclaimed water." Chief among these are the low levels of potent pharmaceuticals, ranging from mood stabilizers and anticonvulsants to sex hormones and tranquilizers, that are present in sewage effluent.

If the City Council heedlessly approves the rate hike for toilet-to-tap, ratepayers still will have some recourse under a sweeping state law, Proposition 218. The measure requires that the city notify ratepayers of the proposed increase and provide them a form by which they can protest it. If a majority of ratepayers return the protest cards – a highly unlikely scenario, since most ratepayers will reflexively discard them – the rate hike would be overturned.

Making good use of the 19,000 acre-feet of wasted reclaimed water from the North City reclamation plant would provide a much larger and safer supply at a fraction of the cost of the toilet-to-tap initiative. The City Council ought to face up to reality and kill the toilet-to-tap boondoggle.

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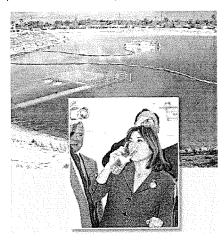
Tools

#### Sewer to Spigot: Recycled Water

By Anjali Athavaley, The Wall Street Journal Last update: 11:14 p.m. EDT May 14, 2008

A growing number of cities and counties grappling with water shortages are turning to a solution that may be tough for some homeowners to stomach: purifying wastewater so that residents can drink it.

In an effort to replenish its groundwater supply, Los Angeles is slated to announce Thursday a plan that will recycle 4.9 billion gallons of treated wastewater to drinking standards by 2019. In San Diego, the city council voted in favor of a pilot project that would pump recycled sewage water into a drinking-water reservoir, despite a veto from the mayor over the system's cost. Miami-Dade County, Fla., is planning a system that would pump 23 million gallons a day of purified wastewater into the ground; the water will eventually travel to a supply well and be reclaimed for drinking use.



Orange County Water DistrictOrange County, Calif., pumps a portion of its treated wastewater to the Miller Basin, where it percolates into deep aquifers and eventually mixes with the drinking water supply (main photo); local officials taste water that's been treated (inset).

Water recycling is just one of a number of tactics parched cities - many of which have faced water shortages for years - are using. "Demand is growing, and supply is pretty much staying static," says Wade Miller, executive director of the WateReuse Association, a nonprofit in Alexandria, Va., that promotes water recycling.

Cities ranging from San Diego to Denver already recycle wastewater for irrigation and industrial use. Some communities, such as the Tampa Bay area of Florida, desalinate seawater, which is generally more expensive than recycling. Many cities are also pushing water-conservation initiatives such as implementing restrictions on when residents can water lawns or offering rebates for high-efficiency washers and toilets.

But cities considering large-scale systems that recycle wastewater to drinking standards may face an uphill battle. Such initiatives - dubbed "toilet to tap" proposals by critics - have encountered resistance in the past as a result of cost and the overall yuck factor. In 2001, Los Angeles scrapped a \$55 million wastewater-recycling project that would have provided the equivalent of the annual water needs of 200,000 city residents. A similar proposal in San Diego was derailed in the late 1990s amid an outcry that poor neighborhoods would be forced to use the wastewater from rich neighborhoods.

The cost of such projects may also be tough for residents to swallow. In Miami-Dade County, the estimated price tag on a new wastewater-recycling system is \$350 million. It is unclear how this will affect the water bills of residents, though local officials expect rates to rise.

The concept of recycling wastewater to meet drinking-water standards isn't new. A handful of cities in the U.S. and abroad have done it on smaller scales and sometimes with older technology. In most cases, the water is disinfected and pumped into an aquifer or reservoir where it remains for a period of time before being distributed to the public through drinking-water wells -- a concept known as indirect potable reuse.



Orange County Water DistrictWastewater in Orange County is treated with reverse osmosis to remove viruses, salts and pharmaceuticals.

Recurring droughts and growing populations are increasing the allure of recycling. In Los Angeles, groundwater contamination in the San Fernando Valley, where the majority of the city's groundwater supply is produced, has limited water available for pumping. "If we don't commit ourselves to conserving and recycling water, we will tap ourselves out," says Los Angeles Mayor Antonio Villaraigosa in a statement.

A new system in Orange County, Calif., where water demand is expected to increase 16% between 2010 and 2030, is the largest and most high-tech in the world. The system, which was launched in January, produces 70 million gallons a day, enough water for 500,000 people a year. It cost \$481 million to construct and costs \$29 million a year to operate. (The county says it offset part of the cost with \$90 million in federal and state grants). Other cities that are planning their own projects say they are using the Orange County system as a standard.

It is a three-step process: Sewer water that has already been treated by the county's sanitation district goes through a microfilter to remove solids and bacteria. It then undergoes a reverse-osmosis treatment, which passes the water through a membrane filter that removes viruses, salts, pharmaceuticals and other materials. Finally, it is treated with ultraviolet light and hydrogen peroxide to get rid of contaminants that are left.

The water is then pumped into a groundwater basin where it mixes with other water and filters through materials like sand, gravel, and clay. It takes about a year for the water to travel to a drinking-water well -- so county residents aren't yet drinking water that has been treated with the new system. The Orange County Water District, which manages the county's groundwater basin, compares its quality to that of distilled water.

Parts of Orange County, though, have been drinking treated wastewater since the 1970s through a system called Water Factory 21, which used reverse osmosis on a smaller scale. That system, when it existed, recycled just five million callons a day.

Doctors and engineers say recycled water is safe to drink. Indeed, reverse osmosis coupled with ultraviolet light and hydrogen peroxide treats wastewater beyond what federal and state drinking standards require, they say.

That wasn't always the case. A National Research Council committee concluded in a 1998 report that reclaimed or purified wastewater can be used to supplement drinking-water sources only as a "last resort" and "after a thorough health and safety evaluation." But Jim Crook, the chair of the committee, says that since that report was issued, there have been a great deal of advances in treatment of wastewater, such as the use of ultraviolet light after reverse osmosis.

"We know a lot more than we did back then, and we can treat it to higher levels," says Mr. Crook, who is a member of an independent advisory panel created to review the Orange County system and a similar independent panel that looked at wastewater recycling in San Diego a few years ago. In Orange County, the purified wastewater is cleaner than the county's groundwater supply, he says.

Recent reports of trace amounts of pharmaceuticals found in drinking water are spurring increased scrutiny of public drinking water supply -- a factor that could affect public opinion of new wastewater-recycling plans. "Many of the pharmaceutical compounds taken nowadays by adults are excreted unchanged in urine, says Jack Skinner, an internal-medicine specialist in Newport Beach, Calif., who serves on a state committee that is evaluating drinking-water standards. "They show up in the wastewater just because of the sheer volume of people taking pharmaceutical compounds now." He adds that endocrine disrupters -- a series of compounds found in birth-control pills and plastics -- have caused birth defects in wildlife and are of particular concern to the public.

But reverse osmosis followed by treatment with ultraviolet light and hydrogen peroxide effectively removes pharmaceutical compounds and endocrine disrupters, as well as any viruses, such as hepatitis, that are spread through oral contact with fecal particles, Dr. Skinner says.

The high price tag of the new recycling systems can also be a hurdle. In San Diego, Mayor Jerry Sanders vetoed a plan to launch a pilot program to recycle wastewater back into the public-drinking-water supply last year. "The mayor determined it was not the best use of financial resources at this time," says Bill Harris, the mayor's spokesman, adding that the city has infrastructure problems that require more immediate attention.

Preliminary estimates of San Diego's pilot project are between \$6 million and \$8 million. If the pilot project is successful, the cost estimate of a larger-scale project is \$237.6 million, according a San Diego study on water reuse released in 2006.

Another issue affecting public perception in San Diego? The proposed project would pump purified wastewater into a reservoir instead of an aquifer. That prevents it from undergoing the same natural filtration process as treated wastewater in Orange County's system.

But the City Council voted to override the mayor's veto in December and forge ahead with the pilot project. "We're just not in a position to turn our nose up at any option to increase water supply," says City Council President Scott Peters.

Skeptics may feel squeamish about drinking what used to be toilet water, Mr. Peters says, but San Diego already receives at least some wastewater from other cities that discharge treated sewage water into the Colorado River. "The Colorado River is not filled with Dasani," Mr. Peters says. "That's where we get our water from."

In Orange County, officials say there was no organized opposition to its groundwater-replenishment system. The county's water district says it minimized outcry with an aggressive public-outreach program that educated local officials, environmental groups, regulatory agencies and the public about the benefits of wastewater recycling.

People who learned about the system early on and were involved in county politics say they have no health concerns. "The public gets a little nervous about it," says Ralph Bauer, 77, a retired research chemist and former Huntington Beach mayor who was on the City Council from 1992 to 2002. But "you can actually make the water purer than what you would get out of rivers and lakes."

Still, some residents find it unsettling." I would never touch it, nor would I give it to my dog to drink," says Carina Sampson, a 29-year-old hairstylist in Anaheim, Calif., who found out about Orange County's groundwater-replenishment system through a friend a few months ago. Anaheim is one of the areas that will eventually receive water that has passed through the new wastewater-treatment process.

Ms. Sampson and her Chihuahua both drink bottled water exclusively. She says of the recycled waste: "I just find it repulsive regardless of what it goes through."

Public opinion of wastewater reuse can shift when people are presented with more details. In a September 2007 survey conducted by the San Diego Institute for Policy Research, 50% of the 1,000 adults in San Diego County who were polled said they opposed turning wastewater into drinking water. Forty-four percent said they supported it, and 6% said they were unsure.

Respondents who weren't strongly committed one way or the other were then presented with an additional piece of information: San Diego gets more of its water supply from the Colorado River than anywhere else. The river gets 400 million gallons of treated wastewater discharged into it each day. That means residents are already drinking treated wastewater.

The survey shows that 64% of these "swing" respondents said they were "more inclined to support" turning wastewater into drinking water. "We found that if just a little bit more education goes on, people's opinion is malleable," says Erik Bruvold, president and chief executive of the San Diego research firm.

Indeed, in Orange County, some opponents changed their minds. California State Assemblyman Michael Duvall, from the Orange County community of Yorba Linda, originally was against groundwater replenishment because of the cost of the system. But after learning just how much water could be recycled, he says, he became a supporter.

"It tastes like distilled water," says Mr. Duvall, who has sampled the water on more than one occasion and has brought family and fellow lawmakers to the plant. "It's about as pure as it can possibly be."

Write to Anjali Athavaley at anjali.athavaley@wsj.com

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Sewer to Spigot: Recycled Water - MarketWatch

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hereby cortify that this is a true copy of papers on file and of record in the chice of the Clerk of said city.

ELIZABETH S. MALAND, City Clerk

(R-2004-440)

RESOLUTION NUMBER R- 298781

ADOPTED ON \_\_\_JAN 1 3 2004

RESOLUTION OF THE CITY COUNCIL REGARDING THE STUDY OF INCREASED ASPECTS OF WATER REUSE

WHEREAS, the Council of the City of San Diego adopted Resolution No. R-291210 on January 19, 1999, directing the City Manager not to spend any monies on water repurification until options for such reuse of water are evaluated and further direction is given by the Council; and

WHEREAS, the State of California in June 2003 issued a report entitled "Water Recycling 2030: Recommendations of California's Recycled Water Task Force," which called for a community-based process to evaluate a wide range of potential uses of recycled water; and

WHEREAS, on October 10, 2003, the City Manager issued City Manager's Report No. 03-203 entitled "Status Report on City of San Diego Long-Range Water Resources Plan (2002-2030)," which identified reclaimed water as an important source of a locally produced water supply and identified the City's two water reclamation plants: the North City Water Reclamation Plant and the South Bay Water Reclamation Plant, as important sources of reclaimed water to reduce the City's imported potable water demand; and

WHEREAS, the City's Natural Resources and Culture Committee on November 19, 2003 heard a full presentation on Alternative Water Sources, including testimony on the recently issued "Water Recycling 2030: Recommendations of California's Recycled Water Task Force" and unanimously recommended that the City Manager conduct a study of all aspects of increased water reuse; NOW, THEREFORE,

BE IT RESOLVED, by the Council of the City of San Diego, that the City Manager is directed to conduct a study of one year duration evaluating all aspects of a viable increased water reuse program, including but not limited to groundwater storage, expansion of the distribution system, reservoirs for reclaimed water, livestream discharge, wetlands development, and reservoir augmentation. The study and report of same shall include a general assessment of costs and benefits of such projects including, but not limited to, consideration of public health, public acceptance, water costs, water supply reliability issues, compilation of research/studies concerning reservoir augmentation, and information concerning potential impacts of pharmaceuticals, endocrine disruptors, personal care products, and additional constituents of the wastewater stream on water quality and health. The study and report, when completed, shall be calendared before the Natural Resources and Culture Committee for such action as it deems appropriate.

APPROVED: CASEY GWINN, City Attorney

Ву

Ted Bromfield

Senior Deputy City Attorney

TB:mb 11/20/03

 $Or.Dept:NRC \ \cdot \\$ 

R-2004-440